

B3  
(cont)

length of the magnetoresistors in the same direction so as to carry current across the magnetoresistors in the same direction.

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**REMARKS**

Claims 1-35 are now in the application. Claims 1-17 and 31 are rejected, claims 18-30 are withdrawn from consideration as being directed to a non-elected invention, and claims 32-35 are newly added.

In section 2 of the Office Action, the Examiner rejected claim 2 under 35 U.S.C. §112, second paragraph as failing to point and distinctly claim the invention. Claim 2 has been amended to overcome this rejection.

In section 4 of the Office Action, the Examiner rejected claims 1, 2, 11, and 31 under 35 U.S.C. §102(b) as being anticipated by the Rahman patent.

Independent claim 1 is directed to an integrated signal isolator having first and second ends. The integrated signal isolator comprises first and second isolator input terminals, first and second isolator output terminals, first and second power supply terminals, first, second, third, and fourth magnetoresistors, and an input strap. The first and second magnetoresistors are coupled to the first isolator

output terminal, the second and third magnetoresistors are coupled to the first supply terminal, the third and fourth magnetoresistors are coupled to the second isolator output terminal, and the first and fourth magnetoresistors are coupled to the second supply terminal. The input strap is disposed with respect to the first, second, third, and fourth magnetoresistors so that a magnetic field is generated over two of the magnetoresistors in one direction, and so that a magnetic field is generated over the other two of the magnetoresistors in an opposite direction.

The Rahman patent discloses in Figure 3 an isolation device that may be used on a monolithic integrated circuit chip and that includes magnetoresistors 37, 38, 39, and 40 arranged in a Wheatstone bridge. An input coil 49, 50, 51, and 52 is provided adjacent to magnetoresistors 37, 38, 39, and 40 as shown and produces a magnetic field at the magnetoresistors 37, 38, 39, and 40.

As can be seen from Figure 3 of the Rahman patent, the magnetic fields generated at the four magnetoresistors are all in different directions. Therefore, the input coil disclosed in the Rahman patent is not disposed as required by independent claim 1. That

is, this input coil is not disposed with respect to the first, second, third, and fourth magnetoresistors so that a magnetic field is generated over two of the magnetoresistors in one direction, and so that a magnetic field is generated over the other two of the magnetoresistors in an opposite direction.

Accordingly, the Rahman patent does not anticipate independent claim 1 and dependent claims 2 and 31.

Independent claim 11 is directed to an integrated signal isolator having first and second ends. The integrated signal isolator comprise first, second, third, and fourth magnetoresistors, and an input strap. The first and second magnetoresistors are coupled to a first isolator output terminal, the second and third magnetoresistors are coupled to a first supply terminal, the third and fourth magnetoresistors are coupled to a second isolator output terminal, and the first and fourth magnetoresistors are coupled to a second supply terminal. The input strap has a first portion running alongside two of the magnetoresistors and a second portion running alongside the other two magnetoresistors so that current supplied to the input strap flows through the first portion in a first direction between the first and second

ends and through the second portion in a second direction between the first and second ends. The first and second directions are substantially opposite to one another.

Thus, because of the relationship between the input strap, the four magnetoresistors, and the direction of the current flow, independent claim 11 requires, in relation to the recited four magnetoresistors, that the input strap has only two portions and that current flows through the input strap in only two directions that are opposite to one another.

By contrast, Figure 3 of the Rahman patent shows that the input coil has four portions and that current flows through the input coil in four directions.

Accordingly, the Rahman patent does not anticipate independent claim 11.

In section 5 of the Office Action, the Examiner rejected claims 1-3, 6, 7, 11-14, and 31 under 35 U.S.C. §102(b) as being anticipated by the Lienhard patent.

The Lienhard patent discloses four magnetoresistors 1, 2, 3, and 4 forming a Wheatstone bridge 5. The Wheatstone bridge 5 is fed by a source 6 and has output terminals 7 and 8. An input current  $I_m$  in an input coil 9 produces a magnetic field  $H_m$  and feedback current  $I_h$  in a feedback coil 10 generates a magnetic

field  $H_h$ . These magnetic fields are oriented such that  $H_a = H_m - H_h$ .

As can be seen from Figure 1 of the Lienhard patent, the magnetic fields generated at the four magnetoresistors 1, 2, 3, and 4 are all in the same direction. Therefore, the input coil 9 is not disposed as required by independent claim 1. That is, this input coil 9 is not disposed with respect to the first, second, third, and fourth magnetoresistors 1, 2, 3, and 4 so that a magnetic field is generated over two of the magnetoresistors in one direction, and so that a magnetic field is generated over the other two of the magnetoresistors in an opposite direction.

Accordingly, the Lienhard patent does not anticipate independent claim 1 and dependent claims 2, 3, 6, 7, and 31.

The Examiner points to the input coil 9 and the feedback coil 10 as the input strap of independent claim 1. However, this interpretation of the Lienhard patent is incorrect. First, if the input coil 9 is coupled to first and second isolator input terminals, the feedback coil 10 is not likewise coupled to these first and second isolator input terminals. Second, the feedback coil 10 is a feedback coil, not an input coil. Third, the field

that is produced by the combination of the input coil 9 and the feedback coil 10 is the field  $H_a$ , and field  $H_a$  passes over the magnetoresistors 1-4 in the same direction.

It is noted that Figures 4 and 5 of the Lienhard patent show magnetic fields  $H_b$ . However, the magnetic fields  $H_b$  are not produced by the input coil 9 and are instead generated by current flowing through the magnetoresistors 1, 2, 3, and 4. That is, the conductor 30 is the conductor that couples the magnetoresistors 1, 2, 3, and 4 together as a Wheatstone bridge.

Moreover, the Lienhard patent does not disclose the relationship between the input coil 9 and the magnetoresistors 1, 2, 3, and 4 as recited in independent claim 11. That is, the Lienhard patent does not show a first portion of the input coil 9 running alongside two of the magnetoresistors 1, 2, 3, and 4 and a second portion running alongside the other two magnetoresistors 1, 2, 3, and 4, and does not show that current supplied to the input coil 9 flows through the first portion in a first direction between the first and second ends and through the second portion in a second opposite direction between the first and second ends.

Accordingly, the Lienhard patent does not anticipate independent claim 11 and dependent claims 12-14.

In section 6 of the Office Action, the Examiner rejected claims 1-17 under 35 U.S.C. §102(b) as being anticipated by the Wan patent.

The Wan patent discloses four magnetoresistors 24, 26, 28, and 30 forming a Wheatstone bridge. The Wheatstone bridge is fed by a source between a pad 44 and pads 40/48, and has output pads 36 and 52. An input strap 70 produces a magnetic field over all four magnetoresistors 24, 26, 28, and 30 in the same direction.

Therefore, the input strap 70 is not disposed as required by independent claim 1. That is, the input strap 70 is not disposed with respect to the first, second, third, and fourth magnetoresistors 24, 26, 28, and 30 so that a magnetic field is generated over two of the magnetoresistors in one direction, and so that a magnetic field is generated over the other two of the magnetoresistors in an opposite direction. Instead, current flowing through the input strap 70, depending on polarity, enters the input strap 70 at the pad 66 and exits the input strap 70 at the pad 68. Accordingly, the

current flows along all of the magnetoresistors 24, 26, 28, and 30 in the same direction producing a magnetic field over all four of these magnetoresistors 24, 26, 28, and 30 in the same direction.

Accordingly, the Wan patent does not anticipate independent claim 1 and dependent claims 2-10.

Moreover, as seen above, the Wan patent does not disclose the relationship between the input strap 70 and the magnetoresistors 24, 26, 28, and 30 as recited in independent claim 11. That is, although the Wan patent shows a first portion of the input strap 70 running alongside two of the magnetoresistors 24, 26, 28, and 30 and a second portion running alongside the other two magnetoresistors 24, 26, 28, and 30, the Wan patent does not show that current supplied to the input strap 70 flows through the first portion in a first direction and through the second portion in a second opposite direction. Instead, the Wan patent shows that current supplied to the input strap 70 flows through the first portion in a first direction and through the second portion in the same first direction.

Accordingly, the Wan patent does not anticipate independent claim 11 and dependent claims 12-17.



It is noted that the Examiner points to the set/reset strap 54 of the Wan patent as the input strap of the rejected claims. However, those practicing in the art of magnetoresistive isolators will understand that a set/reset strap is not an input strap. This difference is exemplified, for example, by claim 9, which adds a set/reset strap to the other limitations of claim 1. Also, the set/reset strap 54 shown in the Wan patent is not coupled between first and second isolator input terminals as required by independent claim 1. Additionally, the only time that the Wan patent uses the term "input" is in relation to the input strap 70. The Wan patent does not use the term "input" in relation to the set/reset strap 54. Moreover, calling an elephant a lion does not make the elephant a lion. Similarly, calling the set/reset strap 54 an input strap does not make the set/reset strap 54 an input strap.

Furthermore, independent claim 11 recites that the first portion of the input strap runs alongside two of the magnetoresistors and that second first portion of the input strap runs alongside the other two magnetoresistors. The set/reset strap 54 disclosed in the Wan patent, however, has a first portion that runs across two of the magnetoresistors and a second first

portion that runs across the other two magnetoresistors. Accordingly, the Wan patent does not disclose the invention of independent claim 11.

The Examiner also relied on the Black patent in rejecting claims 8 and 15. However, the Black patent does not disclose the features of independent claims 1 and 11. Therefore, the combination of the Black patent with any of the other applied references does not disclose or suggest the inventions of independent claims 1 and 11 as well as their dependent claims.

The newly added claims likewise distinguish over the applied references.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached version is captioned **"VERSION WITH MARKINGS TO SHOW CHANGES MADE."**

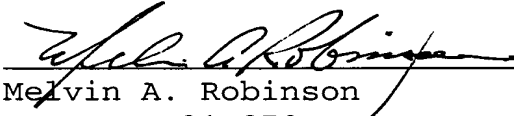
In view of the above, it is clear that the claims of the present application patentably distinguish over the art applied by the Examiner. Accordingly,

allowance of these claims and issuance of the above  
captioned patent application are respectfully requested.

Respectfully submitted,

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION**

The first paragraph following the Summary Of the Invention heading beginning on page 3 is replaced with the following paragraph:

--In accordance with one aspect of the present invention, an integrated signal isolator has first and second ends and comprises first and second isolator input terminals, first and second isolator output terminals, first and second power supply terminals, first, second, third, and fourth magnetoresistors, and an input strap. The first and second magnetoresistors are coupled to the first isolator output terminal, the second and third magnetoresistors are coupled to the first supply terminal, the third and fourth magnetoresistors are coupled to the second isolator output terminal, and the first and fourth magnetoresistors are coupled to the second supply terminal. The input strap has at least one turn coupled between the first and second isolator input terminals. The input strap is disposed with respect to the first, second, third, and fourth magnetoresistors so that a magnetic field is generated over two of the magnetoresistors in one direction, and so that a magnetic

field is generated over the other two of the magnetoresistors in an opposite direction.-

**IN THE CLAIMS**

Claim 2 is amended as follows:

2. (Amended) The integrated signal isolator of claim 1 wherein the at least one turn of the input strap is disposed with respect to the first, second, third, and fourth magnetoresistors so that, when input current flows between the first and second isolator input terminals, a first field is generated across [the set/reset direction and two of] the first[, ] and second[, third, and fourth] magnetoresistors and a second field is generated across the [other two of the first, second, third[, ] and fourth magnetoresistors and so that the first and second fields point in substantially opposite directions thereby producing an output across the first and second isolator output terminals commensurate with the input current.

The following claims are added:

32. The integrated signal isolator of claim 1 wherein the input strap has a first portion running along a length of the two of the magnetoresistors and a second

portion running along a length of the other two of the magnetoresistors.

33. The integrated signal isolator of claim 32 wherein the first portion runs along the length of the first and second magnetoresistors and the second portion runs along the length of the third and fourth magnetoresistors.

34. The integrated signal isolator of claim 1 further comprising a set/reset strap positioned to generate a set/reset magnetic field over the magnetoresistors.

35. The integrated signal isolator of claim 34 wherein the set/reset strap perpendicularly crosses a length of the magnetoresistors in the same direction so as to carry current across the magnetoresistors in the same direction.